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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
LAU, TUNG S	

ART UNIT	PAPER NUMBER
2863	

DATE MAILED: 09/06/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/773,860	BANGINWAR ET AL.	
	Examiner	Art Unit	
	Tung S. Lau	2863	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-26 and 28* is/are rejected.

7)☒ Claim(s) *27* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See ofice action*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed 08/16/2006 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because the date of the publication of the references is/are missing. It has been placed in the application file, but the information referred to therein has not been considered as to the merits (item on the NPL section of the IDS). Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609 C(1).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-26 and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Jason Flinn and M. Satyanarayanan (Energy-aware adaptation for mobile applications, School of Computer Science, Carnegie Mellon University, 12/1999).

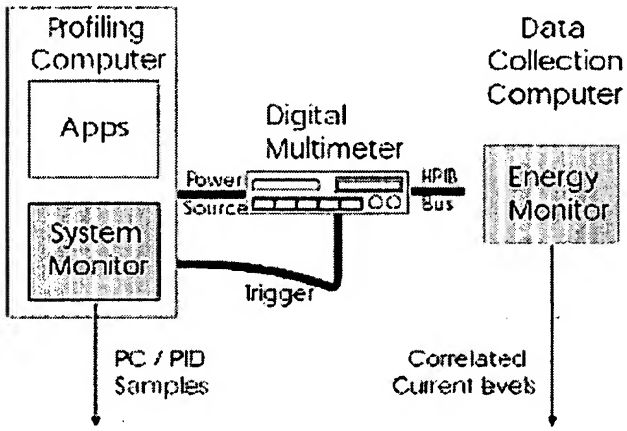
Regarding claim 1:

Jason Flinn and M. Satyanarayanan disclose an article comprising a machine-accessible medium having stored thereon instructions that, when executed by a machine, cause the machine to: measure power usage on the machine (page 1-2, section 2.1, fig. 2); determine when a quantum of power has been used on the machine (page 1-2, section 2.1, fig. 2, specially different module use different power in fig. 2); in response to usage of the quantum of power on the machine (page 1-2, section 2.1, fig. 2), trigger sampling of state data of the machine where the state data indicates a state of code execution on the machine (page 1-2, section 2.1, specially the power were trigger by module of the individual processes, for example of modules show in fig. 2); analyze performance of the code execution on the machine based on sampled state data (page 1-2, section 2.1, fig. 2); and develop a machine storable profile of power usage of the code executing on the machine (page 1-2, section 2.1-2.2, fig. 3, where a particular module are tested for power usage using API in section 2.2).

Regarding claim 10:

Jason Flinn and M. Satyanarayanan disclose a method of profiling code executable on a machine (fig. 1, Energy monitor, page 2, Lines 6-22), the method comprising: measuring power usage on the machine (fig. 2); determining when a plurality of a quantum of power has been used on the machine (fig. 2, fig. 3); and in response to usage of the quantum of power on the machine, sampling state data on the machine (fig. 3, page 3, Lines 7-22), where the state data indicates a state of code execution on the machine (page 3, Lines 7-22, fig. 6); analyzing

performance of the code execution on the machine based on sampled state data (fig. 5, 6), and developing a machine storable profile of power usage of the code executing on the machine (page 1-2, section 2.1-2.2, fig. 3, where a particular module are tested for power usage using API in section 2.2).



This hardware setup is used during PowerScope data collection. A data collection computer distinct from the profiling computer controls the multimeter and stores samples from it. Later, program counter and process id samples are correlated offline with current levels to yield energy profiles.

Figure 1. Data collection in PowerScope

Regarding claim 20:

Jason Flinn and M. Satyanarayanan disclose an apparatus comprising: a power measurement module (fig. 1, energy monitor) capable of measuring power usage in the apparatus and capable of determining when a quantum of power has been used (fig. 4, page 2, Lines 6-22); and a power sampling module (fig. 1, energy monitor) coupled to the power measurement module for sampling state data of the apparatus in response to an indication of when each of a plurality of quantum of power has been used (page 1, section 2.1, fig. 1, system monitor, fig. 6); the

power measurement module being disposed to indicate the usage of the quantum to the power sampling module (fig. 1, unit digital multimeter, fig. 3, unit Kernel); and a power analysis module (fig. 3, Odyssey) that analyzes code execution on the apparatus in response to the sampling of the state data to develop a power profile of the code (page 2, Lines 23-31, fig. 5, fig. 6).

Process	CPU Time(s)	Total Energy(J)	Average Power(W)
/usr/odyssey/bin/xanim	66.57	643.17	9.66
/usr/X11R6/bin/X	35.72	331.58	9.28
Kernel	50.89	328.71	6.46
Interrupts-WaveLAN	18.62	165.38	8.91
/usr/odyssey/bin/odyssey	12.19	123.40	10.12
Total	183.99	1592.75	8.66

Energy Usage Detail for process /usr/odyssey/bin/odyssey

Procedure	CPU Time(s)	Total Energy(J)	Average Power(W)
_Dispatcher	0.25	2.53	10.11
_IOMGR_CheckDescriptors	0.17	1.74	10.23
_sftp_DataArrived	0.16	1.68	10.48
_rpc2_RecvPacket	0.16	1.67	10.41
_ExaminePacket	0.16	1.66	10.35

This figure shows a sample energy profile. The first table summarizes the energy usage by process, while the table below shows a portion of the detailed profile for a single process. Only part of the full profile is shown.

Figure 2. Example of an energy profile

Regarding claim 2, Jason Flinn and M. Satyanarayanan further disclose the article of having further instructions that, when executed by the machine (fig. 3, Kernel), cause the machine to provide the sampled state data to a performance

analysis module (fig. 3, Odyssey, fig. 4, 6)), and compare the sampled state data to previously sampled state date for determining the profile of a power profile of the code based on the state data (fig. 2, 4, 6).

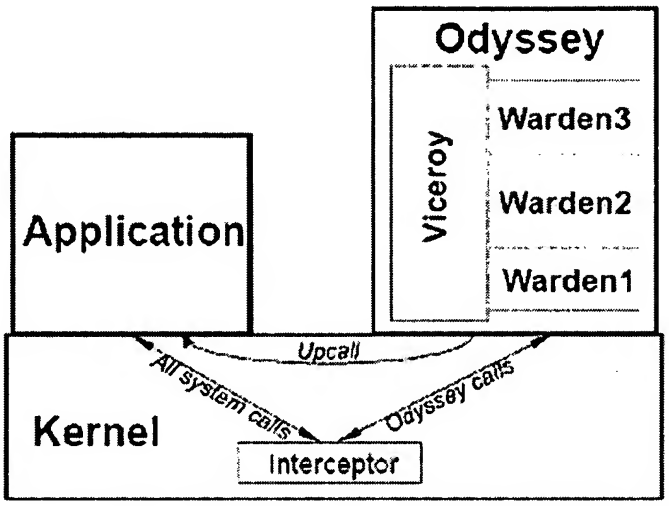


Figure 3. Odyssey architecture

Regarding claim 3, Jason Flinn and M. Satyanarayanan further disclose the article wherein the machine has a power measurement module (fig.1, Energy Monitor, fig. 4).

Regarding claim 4, Jason Flinn and M. Satyanarayanan further disclose the article wherein the machine comprises a plurality of subsystems (fig. 4) and wherein the power measurement module is coupled to at least one of the plurality of subsystems for measuring power usage of the at least one of the plurality of subsystems (fig. 4).

Regarding claim 5, Jason Flinn and M. Satyanarayanan further disclose the article of claim 4, having further instructions that when executed on the machine, cause the machine to: measure power usage of at least one of the plurality of subsystems (fig. 3, Odyssey, Page 2, Lines 23-31, Application, fig. 4)

Component	State	Power (W)
Display	Bright	4.54
	Dim	1.95
WaveLAN	Idle	1.46
	Standby	0.18
Disk	Idle	0.88
	Standby	0.24
Other	Idle	3.20

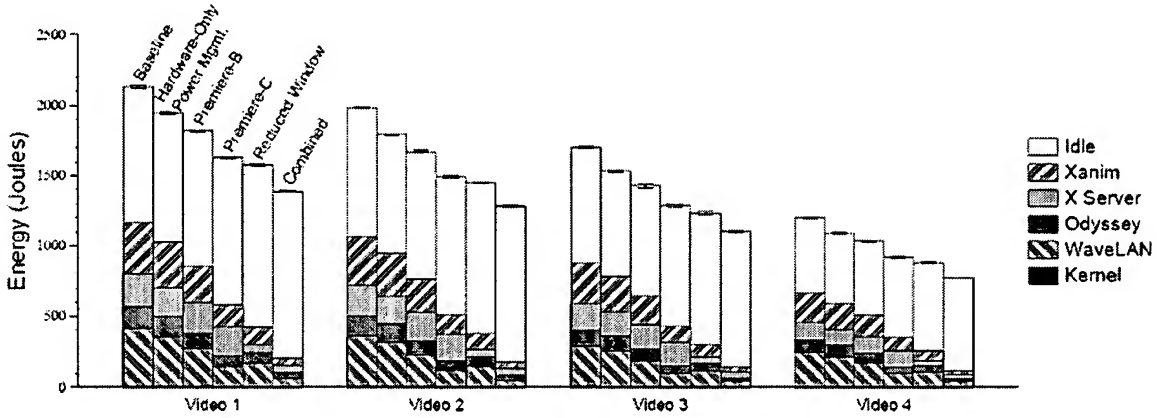
Background (display dim, WaveLAN & disk standby) = 5.6 W.

This figure shows the measured power consumption of components of the IBM 560X laptop. Power usage is slightly but consistently superlinear; for example, the laptop uses 10.28 W when the screen is brightest and the disk and network are idle — 0.21 W more than the sum of the individual power usage of each component. The last row shows the power used when the disk, screen, and network are all powered off. Each value is the mean of five trials — in all cases, the sample standard deviation is less than 0.01 W.

Figure 4. Power consumption of IBM ThinkPad 560X

Regarding claim 6, Jason Flinn and M. Satyanarayanan further disclose the article of claim 5, wherein the at least one of the plurality of subsystems includes a network subsystem (fig. 4, specially LAN network), a graphics display

subsystem (fig. 4, 6, specially display video), or a data storage subsystem (fig. 4, specially disk).



This figure shows the energy used to display four QuickTime/Cinepak videos from 127 to 226 seconds in length, ordered from right to left above. For each video, the first bar shows energy usage without hardware power management or fidelity reduction. The second bar shows the impact of hardware power management alone. The next two show the impact of lossy compression. The fifth shows the impact of reducing the size of the display window. The final bar shows the combined effect of lossy compression and window size reduction. The shadings within each bar detail energy usage by software component. Each value is the mean of five trials — the error bars show 90% confidence intervals.

Figure 6. Energy impact of fidelity for video playing

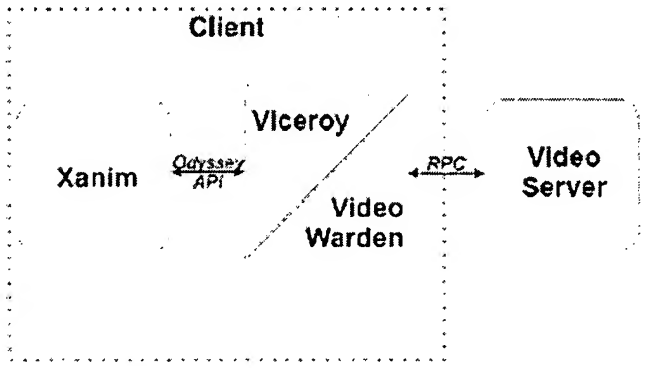


Figure 5. Odyssey video player

Regarding claim 7, Jason Flinn and M. Satyanarayanan further disclose the article wherein the at least one of the plurality of subsystems includes an

input/output device (fig. 7, 8, specially a speech recognition system) or an expansion slot subsystem.

Regarding claim 8, Jason Flinn and M. Satyanarayanan further disclose the article wherein the state data is a program counter (page 2, Lines 6-22) indicative of a state of execution of the code (fig. 6).

Regarding claim 9, Jason Flinn and M. Satyanarayanan further disclose the article wherein the state data comprises a program counter (page 2, Lines 6-22), status of the machine (fig. 4, 6), status of at least one subsystem of the machine (fig. 4, 6), status of at least one component of the machine (fig. 4), or status of at least one functional unit embedded in a subsystem (fig. 4, 5, 6).

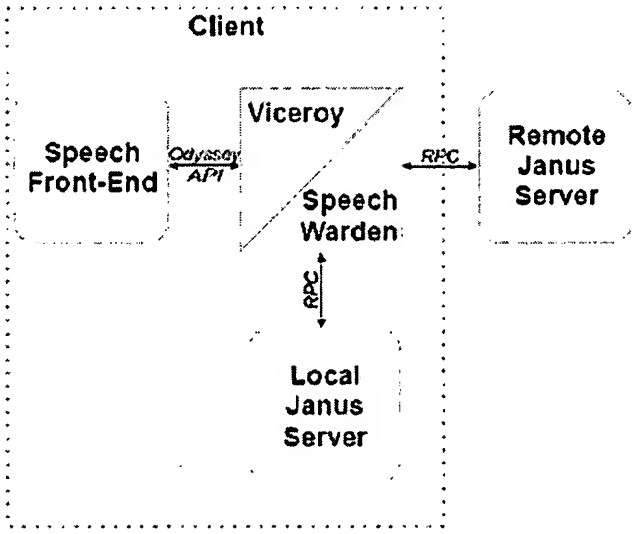


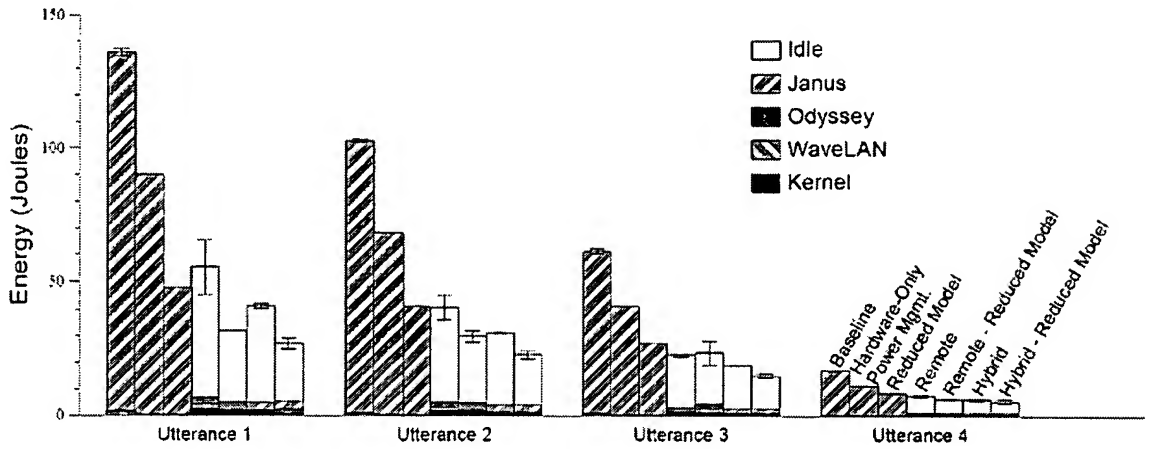
Figure 7. Odyssey speech recognizer

Regarding claim 24, Jason Flinn and M. Satyanarayanan further disclose

the article of claim 1, having further instructions that when executed on the machine (fig. 3, Odyssey), cause the machine to profile the code executing (page 2, Lines 21-31), on the machine (fig. 4, 6, 8, 11, 16) by profiling the power usage of instructions or functions executed by the code (page 2, section 2.2, where API were integrated into local OS machine)

Regarding claim 25, Jason Flinn and M. Satyanarayanan further disclose the article wherein the machine comprises a plurality of subsystems (fig. 2, 4), the article having further instructions that when executed on the machine (page 2, Lines 6-23), cause the machine to determine power usage of the code executing within one of the plurality of subsystems (fig. 2, page 2, lines 21-31, fig. 3, Odyssey).

Regarding claim 26, Jason Flinn and M. Satyanarayanan further disclose the article wherein the state data comprises a stack pointer, current memory usage (page 9, lines 1-12), a number of instructions executed, or a number of accesses to a memory storage.



This figure shows the energy used to recognize four spoken utterances from one to seven seconds in length, ordered from right to left above. For each utterance, the first bar shows energy consumption without hardware power management or fidelity reduction. The second bar shows the impact of hardware power management alone. The remaining bars show the additional savings realized by adaptive strategies. The shadings within each bar detail energy usage by activity. Each measurement is the mean of five trials — the error bars show 90% confidence intervals.

Figure 8. Energy impact of fidelity for speech recognition

Regarding claim 11, Jason Flinn and M. Satyanarayanan further disclose the method wherein the machine comprises a plurality of subsystems, and wherein measuring power usage comprises measuring power delivered to at least one of the plurality of subsystems (fig. 4).

Regarding claim 12, Jason Flinn and M. Satyanarayanan further disclose the method wherein the machine comprises a plurality of subsystems, measuring power usage comprising measuring power consumed by at least one of the plurality of subsystems (fig. 4).

Regarding claim 13, Jason Flinn and M. Satyanarayanan further disclose the method wherein the machine comprises a plurality of subsystems and a power measurement module capable of measuring current or power delivered to at least one of the plurality of subsystems (fig. 4, 6, 8, page 2, Lines 6-22).

Regarding claim 14, Jason Flinn and M. Satyanarayanan further disclose the method wherein the at least one of the plurality of subsystems includes a network subsystem (fig. 4, LAN), a graphics display subsystem (fig. 4, display), or a data storage subsystem (fig. 4, disk).

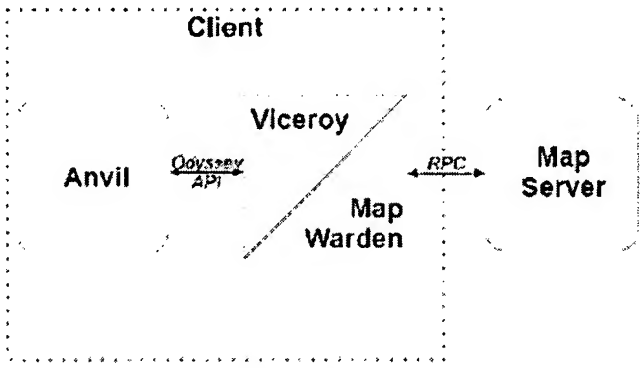


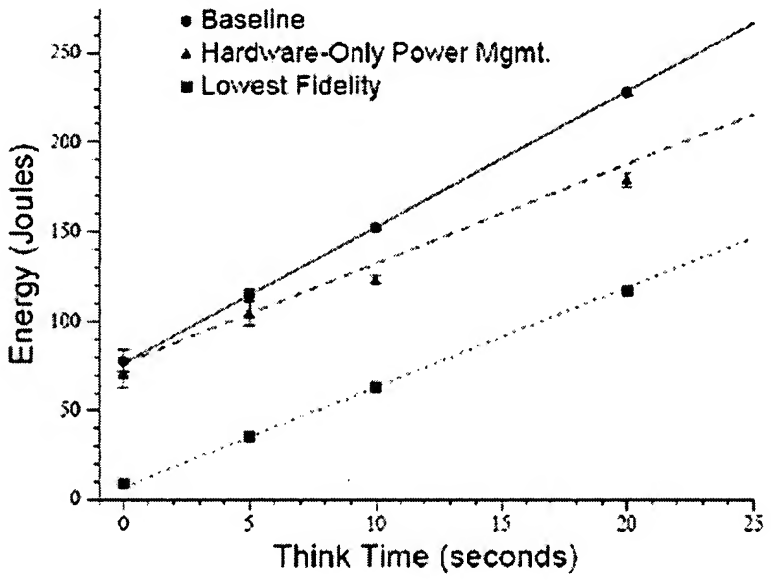
Figure 9. Odyssey map viewer

Regarding claim 15, Jason Flinn and M. Satyanarayanan further disclose the method wherein the at least one of the plurality of subsystems includes an input device (fig. 4, LAN, disk, display) or an expansion slot device.

Regarding claim 16, Jason Flinn and M. Satyanarayanan further disclose the method further comprising: providing power to the machine (page 2,Lines 6-22).

Regarding claim 17, Jason Flinn and M. Satyanarayanan further disclose the method wherein determining the profile of power usage of the code executing on the machine comprises: comparing the state data sampled over a plurality of quantums of power usage (fig. 2) and profiling instruction (page 2, section 2.2, where API where use) or function executed by the code during the usage the plurality of quantums of power usage (fig. 2).

Regarding claim 18, Jason Flinn and M. Satyanarayanan further disclose the method wherein the state data is a program counter (page 2,Lines 6-22).



This figure shows how the energy used to view the San Jose map from Figure 10 varies with think time. The data points show measured energy usage. The solid, dashed and dotted lines represent linear models for energy usage for the base-line, hardware-only power management and lowest fidelity cases. The latter combines filtering and cropping, as in the rightmost bars of Figure 10. Each measurement is the mean of ten trials — the error bars are 90% confidence intervals.

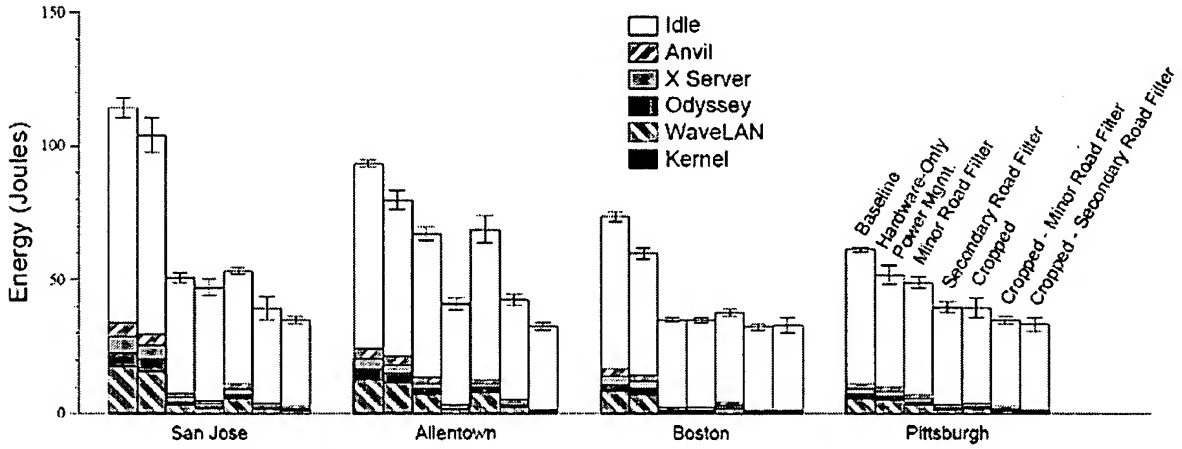
Figure 11. Effect of user think time for map viewing

Regarding claim 19, Jason Flinn and M. Satyanarayanan further disclose the method wherein the state data comprises a program counter (page 2,Lines 6-22), status of the machine (fig. 4), status of at least one subsystem of the machine (fig. 4), status of at least one component of the machine (fig. 4), or status of at least one functional unit embedded in a subsystem (fig. 4, 2).

Regarding claim 21, Jason Flinn and M. Satyanarayanan further disclose the apparatus further comprising a power source (page 2, Lines 6-22).

Regarding claim 22, Jason Flinn and M. Satyanarayanan further disclose the apparatus wherein the power analysis module compares the sampled state data to stored state data (fig. 6, 8, 10, 11).

Regarding claim 23, Jason Flinn and M. Satyanarayanan further disclose the apparatus wherein the state data comprises a program counter (page 2, Lines 6-22), status of the machine (fig. 4), status of at least one subsystem of the machine (fig. 4), status of at least one component of the machine (fig. 4), or status of at least one functional unit embedded in a subsystem (fig. 2, 4, 16).



This figure shows the energy used to view four U.S.G.S. maps. For each map, the first bar shows energy usage without hardware power management or fidelity reduction, with a 5 second think time. The second bar shows the impact of hardware power management alone. The remaining bars show the additional savings realized by degrading map fidelity. The shadings within each bar detail energy usage by activity. Each measurement is the mean of ten trials—the error bars are 90% confidence intervals.

Figure 10. Energy impact of fidelity for map viewing

Application	Think Time (s.)	Baseline	Hardware Power Mgmt.	Fidelity Reduction	Combined
Video	N/A	1.00	0.90–0.91	0.84–0.84	0.65–0.65
Speech	N/A	1.00	0.66–0.67	0.22–0.36	0.20–0.31
Map	0	1.00	0.80–1.01	0.06–0.13	0.07–0.18
	5	1.00	0.81–0.91	0.38–0.67	0.31–0.54
	10	1.00	0.74–0.84	0.53–0.77	0.42–0.58
	20	1.00	0.76–0.78	0.69–0.89	0.51–0.67
Web	0	1.00	0.85–1.06	0.40–0.75	0.32–0.54
	5	1.00	0.74–0.78	0.88–0.97	0.66–0.71
	10	1.00	0.75–0.78	0.93–0.98	0.70–0.74
	20	1.00	0.74–0.77	0.96–0.99	0.72–0.73

This table summarizes the impact of data fidelity on application energy consumption. Each entry shows the minimum and maximum measured energy consumption for four data objects. The entries are normalized to baseline measurements of full fidelity objects with no power management. This data was extracted from Figures 6, 8, 10 and 13.

Figure 16. Summary of energy impact of fidelity

Regarding claim 28, Jason Flinn and M. Satyanarayanan further discloses wherein the machine has a power measurement module (fig. 3, Kernel), a central processing unit (fig. 3, Odyssey module), and a plurality of functional units embedded within the central processing unit (fig. 3, warden 1, warden 2, warden 3) wherein the power measurement module is coupled to the central processing unit for measuring power usage of at least one of the plurality of functional units enabled within the central processing unit (page 2, section 2.2, fig. 6, where each module warden 1-3, measure each particular function that is video , speech, etc, power usage level show in fig. 6).

Allowable Subject Matter

3. Claim 27 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all the limitation of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter.

Regarding claim 27, having further instructions that when executed on the machine cause the machine to adjust granularity of the quantum of power.

Response to Arguments

4. Applicant's arguments with respect to the amended claims filed 08/16/2006 have been considered but they are not persuasive.

A. The examiner likes to point out that citations were omitted by mistake on claim 1 of the previous action, but other independent claims and dependent claims clearly pointed out the limitation in claim 1. However, this action clearly pointing out each claim limitation discloses in the same prior art of record.

B. Applicant argues that the prior art does not show the claim subject matter in claim 28. Jason Flinn and M. Satyanarayanan further discloses wherein the machine has a power measurement module (fig. 3, Kernel), a central processing unit (fig. 3, Odyssey module), and a plurality of functional units embedded within the central processing unit (fig. 3, warden 1, warden 2, warden 3) wherein the power measurement module is coupled to the central processing unit for measuring power usage of at least one of the plurality of functional units enabled within the central processing unit (page 2, section 2.2, fig. 6, where each module warden 1-3, measure each particular function that is video , speech, etc, power usage level show in fig. 6).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung S Lau whose telephone number is 571-272-2274. The examiner can normally be reached on M-F 9-5:30. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on 571-272-2269. The fax phone numbers for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TL

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